

## TORREYA

November, 1905

LIBRARY  
NEW YORK  
BOTANICAL  
GARDEN

## THE PLANT FORMATIONS OF THE ADIRONDACK MOUNTAINS

BY JOHN W. HARSHBERGER

Geologically and physiographically, the life-history of the Adirondack Mountains has been long and complex. Commencing at some period of Archean time, long before the beginning of the known geologic record, they have maintained a land condition almost, if not quite, down to the present time. Since the earliest time many thousands of feet of strata have been removed, until now the various elevations stand revealed to us in a planed-down character. We now find them to be mountains of considerable elevation, somewhat rugged in outline, but much less rugged than the Andes, Alps, or Rocky Mountains. There are few lofty, inaccessible cliffs, but instead, rounded, easily scaled hills and mountain peaks, reaching only very rarely to a height greater than one mile above sea-level. This rounded form has been emphasized by the scouring action of the ice of the glacial period, which covered the highest peaks of these mountains. Mt. Tahawus (Mt. Marcy) is the highest peak (5,344 feet) and Mt. McIntyre comes next (5,112 feet).

The plant formations have been developed in the period of time since the retreat of the glacial ice-sheet. One can clearly trace the sequence of development, not only in the conversion of lakes into bogs and bogs into mountain meadows, but also in the forest formations and associations themselves. The following brief account presents the result of a study of these formations made in the summer of 1904, when the author had the pleasure of botanizing with Dr. Oscar Drude, professor of botany in the Dresden Technical High School and director of the Royal Botanic Garden, Dresden. The elevations were determined by

[No. 10, Vol. 5, of TORREYA, comprising pages 171-186, was issued October 27, 1905.]

Professor Drude, who brought an aneroid barometer with him to America.

DECIDUOUS FOREST FORMATION.—The forest at the base of Mt. Tahawus along the Au Sable River and about the Au Sable lakes, according to my observations, consists of the following dominant species: \* *Betula lutea*, *Fagus americana*, *Acer saccharum*, *Tsuga canadensis*, *Thuja occidentalis*, *Pinus Strobus*, *Abies balsamea* and *Betula papyrifera* (the *Fagus-Acer-Betula* facies), while as secondary trees grow *Acer rubrum*, *Acer pennsylvanicum*, *Populus tremuloides*, *Sorbus americana* and beneath the latter *Viburnum alnifolium*, *Rubus odoratus* and *Viburnum cassinoides*. Such are called in Adirondack phraseology, hardwood lands, which occupy in general the elevated flats and slopes where the deciduous-leaved trees are the characteristic species. *Acer saccharum*, *Betula lutea* and *Fagus americana* attain their best development on these lands, while *Tsuga canadensis* is of inferior quality to that found on the moister soil of lower ground. † Along the Au Sable River, near its source, in a deep gorge were found in association *Acer saccharum*, *Tsuga canadensis* and *Betula lutea* as the dominant species, while the beech, *Fagus americana*, seems to have a crown which never rises quite above that of the trees mentioned (*Tsuga-Fagus* facies). The herbaceous plants of the forest floor are *Viola rotundifolia*, *Tiarella cordifolia*, *Medeola virginica*, *Mitchella repens*, *Unifolium canadense*, *Clintonia borealis*, *Trillium undulatum*, *Streptopus amplexifolius*, *Pyrola chlorantha*, *Oxalis Acetosella*, *Aralia racemosa*, *Dalibarda repens* and *Lycopodium lucidulum*. *Taxus canadensis* forms a secondary element in the *Tsuga-Fagus* facies. *Polypodium vulgare* forms mats in undisputed possession of the tops of boulders, while the rock sides are distinguished by the presence of species of *Umbilicaria*. *Dryopteris noveboracensis* forms extensive patches in the deep recesses of the forest.

The shores of lower Au Sable Lake, which are mountainous and steep, are covered with *Betula papyrifera* associated with *Abies balsamea* and *Populus tremuloides*, while near the upper end

\* Names according to Britton's Manual, 1901.

† Pinchot, G. The Adirondack Spruce, 12. 1898.

of this lake grow *Sorbus americana*, *Picea Mariana* and *Acer saccharum*, and *Thuja occidentalis* becomes more abundant and virtually supplants the paper birch, *Betula papyrifera*. The vegetation of the forest floor here consists of *Clintonia borealis*, *Oxalis Acetosella*, *Osmunda Claytoniana* (= *O. interrupta*), *O. cinnamomea*, *Chiogenes hispidula*, *Unifolium canadense* and *Veratrum viride*.

The forest about Raquette Lake is a mixed one of broad-leaved and coniferous trees, the latter predominating. Such are the spruce flats of the lumbermen, where the soil is fresh and deep, with *Picea Mariana* (= *P. rubens* Sargent), of medium height and diameter. These flats form the lower limit of *Acer saccharum*, which is common on higher ground. *Abies balsamea* is small. The principal species, in the order in which they occur, are: *Picea Mariana* (= *P. rubens* Sargent), *Betula lutea*, *Abies balsamea*, *Tsuga canadensis*, *Fagus americana*, *Acer saccharum* and *Pinus Strobus* (*Picea-Betula* facies). With these are associated *Thuja occidentalis*, *Picea Mariana*, *Larix americana*, *Pinus resinosa*, *Acer saccharinum* (= *A. dasycarpus*) and *Betula populifolia*, with scattered *Fraxinus americana* and *Prunus serotina*. *Populus tremuloides* and *Prunus pennsylvanica* are found on the burned-over land with an undergrowth in the primeval forest of *Viburnum alnifolium*, *Acer pennsylvanicum* and *Acer spicatum*. Here, the characteristic swamp species are *Picea Mariana* (red spruce = *P. rubens* Sargent), *Abies balsamea*, *Picea Mariana* (black spruce), *Pinus Strobus*, *Larix americana*, while on the gravelly knolls in the swamps occur *Pinus Strobus*, *Tsuga canadensis*, *Picea Mariana* (= *P. rubens* Sargent), *Abies balsamea*, etc. *Thuja occidentalis* and *Larix americana* grow on the poorest drained land.\*

The forest about Tupper Lake is characterized by *Picea Mariana* (= *P. rubens* Sargent), *Acer saccharum*, *Fagus americana*, and *Betula lutea*. The sugar maple, *Acer saccharum*, and beech, *Fagus americana*, have the advantage over *Betula lutea* on the

\* Hosmer, R. S., and Bruce, E. S. A Forest working Plan for Township 40. Bulletin 30, Division of Forestry, U. S. Department Agriculture. 1901.

Graves, H. S. Practical Forestry in the Adirondacks, Bulletin 26, Division of Forestry. 1899.

better soils, because the latter is less tolerant of shade. The following list shows the relative degree of tolerance beginning with those that require the most light: *Larix americana*, *Populus tremuloides*, *Prunus pennsylvanica*, *Pinus Strobus*, *Betula lutea*, *Acer rubrum*, *Abies balsamea*, *Picea Mariana* (= *P. rubens* Sargent), *Tsuga canadensis*, *Fagus americana* and *Acer saccharum*, while the best soils support *Fagus americana*. *Acer saccharum* and species in general may be arranged according to edaphic requirements, beginning with the most requiring: *Prunus scrotina*, *Acer saccharum*, *Fagus americana*, *Acer rubrum*, *Pinus Strobus*, *Abies balsamea* and *Picea Mariana* (= *P. rubens* Sargent).

As one ascends, the facies in some places consists of the deciduous species mentioned with such ferns and herbs on the ground as *Adiantum pedatum*, *Polystichum acrostichoides*, *Monotropa uniflora*, *Chiogenes hispidula*, *Clintonia borealis*, *Cornus canadensis* and *Panicularia clongata*. At 3,600 feet, especially on the southern flanks of Mt. Tahawus, the forest formation consists of *Picea Mariana* (red spruce = *P. rubens* Sargent), *Betula lenta*, *Betula lutea*, *Sorbus americana*, *Abies balsamea* and *Thuja occidentalis*; and *Veratrum viride* occurs on the forest floor with *Vaccinium canadense*, *Lycopodium annotinum*, *L. lucidulum*, *Aster acuminatus*, *Solidago flexicaulis*, *Coptis trifolia*, *Linnaca americana* and *Streptopus amplexifolius*. *Solidago flexicaulis* may be the lowland representative of the alpine *Solidago alpestris*.

CONIFEROUS FORMATION.—These southern slopes are the spruce slopes, according to the designation of the lumbermen, because *Picea Mariana* (= *P. rubens* Sargent) is dominant. The absence of *Acer saccharum*, *Acer rubrum* and *Viburnum alnifolium* is due to elevation and is noteworthy. *Abies balsamea* on an elevated saddle of the mountain forms a pure forest with shrubby and herbaceous companions (*Abies* facies), and in open swampy places surrounded by the balsam occur *Osmunda cinnamomca* and *Veratrum viride*.

The "Krumm-holz," or dwarf timber, is reached at 5,000 feet (1,530 m.) on Mt. Tahawus (Mt. Marcy). Here *Abies balsamea* is about five feet high, with its base covered by *Hypnum splendens*, *H. Crista-castrensis* and *Dicranum* sp., with *Linnaca americana*,

*Chiogenes hispidula* and *Cornus canadensis* beneath, while *Vaccinium canadense* and *Sorbus americana* are prominent shrubs. At 1,550 meters trees are only 1–2 feet high, and disappear entirely, being replaced in exposed places by *Ledum groenlandicum*, *Vaccinium uliginosum* and *V. caespitosum* (*Vaccinium-Ledum* association), *Empetrum nigrum* (*Empetrum* association), *Alnus alnobetula* (*Alnus* association), and in sheltered places are found *Spiraea salicifolia*, *Gentiana linearis*, *Veratrum viride* and *Linnæa americana*.

ALPINE PLANT FORMATION. — The plants on the bare top (5,300 feet), collected by the writer,\* are *Coptis trifolia*, *Viola blanda*, *Arenaria groenlandica*, *Oxalis Acetosella*, *Sibbaldiopsis tridentata*, *Rubus strigosus*, *Sorbus americana*, *Spiraea salicifolia*, *Ribes prostratum*, *Cornus canadensis*, *Linnæa americana*, *Houstonia caerulea*, *Solidago alpestris*, *Nabalus Bootii*, *Vaccinium caespitosum*, *V. pennsylvanicum*, *V. pennsylvanicum angustifolium*, *V. uliginosum*, *Oxycoccus Oxycoccus*, *Chiogenes hispidula*, *Chamaedaphne calyculata* (*Cassandra calyculata*), *Ledum groenlandicum*, *Kalmia glauca*, *Rhododendron lapponicum*, *Rhinanthus Crista-Galli*, *Trientalis americana*, *Diapensia lapponica*, *Gentiana linearis*, *Empetrum nigrum*, *Betula glandulosa*, *Alnus alnobetula*, *Salix Uva-Ursi*, *Abies balsamea*, *Veratrum viride*, *Eriophorum vaginatum* and *Lycopodium Selago*. A singular lichen, *Thamnolia vermicularis*, attracts the attention by its pure white color, and its cylindrical, hollow sharp-pointed podetia 2–4 inches long, growing among mosses and on the thin soil of the mountain-top under sterile conditions. It is more plentiful, according to Professor Peck, on Mt. McIntyre than on Mt. Tahawus (Mt. Marcy). *Lonicera coerulca* ascends almost to the top of the mountain. It occurs behind the sheltering rocks but a short distance south of the signal station. *Carex Bigelovii* is the only sedge on the highest part of the mountain.†

BOG FORMATION.—Two small marshy areas form a part of the open summit of Mount Tahawus. One is a decided depression

\* The ascent was made by Professor Drude and the writer on August 26, 1904.

† Peck, C. H. Plants of the Summit of Mt. Marcy. Bulletin New York State Museum 5: 657. 1899.

in the northeast slope; the other is on the eastern slope and is much nearer the top of the mountain. Here were found by me, *Kalmia glauca*, *Ledum groenlandicum*, *Oxycoccus Oxycoccus*, *Eriophorum vaginatum*, *Veratrum viride*, *Vaccinium uliginosum* and several species of *Carex*.

Giant Mountain (4,622 feet) is not bare at the summit, except where shelving rocks occur. Here were found by me *Ledum groenlandicum*, *Arenaria groenlandica*, *Marchantia polymorpha* (in burned areas), *Agrostis rubra*, *Vaccinium pennsylvanicum*, *Linnaca americana* and *Cornus canadensis*. The summits of lower mountains, Mt. Hopkins (3,136 feet) for example, are not above timber-line, but frequently they are bare owing to rock exposures. On this mountain, a smooth rock surface is found, in the broken parts of which grow *Sibbaldiopsis tridentata* (*Sibbaldiopsis* association), while *Vaccinium uliginosum* (*V. uliginosum* association), *Alnus alnobetula* (*Alnus* association), *Vaccinium pennsylvanicum*, *V. pennsylvanicum angustifolium* and *V. canadense* are found along the edge of the forest, which consists at this elevation of *Picea Mariana*, *Betula papyrifera*, *B. lenta*, *Prunus pennsylvanica*, *Acer pennsylvanicum*, *Pinus Strobus*, *Populus tremuloides*, *Thuja occidentalis* and *Abies balsamea*, that reach to the top of the mountain.

HEMLOCK FORMATION. — The hemlock, *Tsuga canadensis*, forms a pure forest upon the ridges at the foot of Giant Mountain. Here the beech, *Fagus americana*, *Acer rubrum* and *Acer pennsylvanicum* are subordinate species with a few spruce trees (*Picea*) intermixed. The herbaceous undergrowth is typical of such forests, consisting of *Linnaca americana* (in mats), *Mitchella repens*, *Cornus canadensis*, *Pyrola chlorantha*, *Oxalis Acetosella*, *Clintonia borealis*, *Peramium repens* (*Goodyera repens*), *Medeola virginica*, *Pyrola secunda*, *Viola rotundifolia*, *Chimaphila umbellata*, *Gaultheria procumbens*, *Coptis trifolia*, *Unifolium canadense*, *Cypripedium acaule*, *Lysias orbiculata* (*Habenaria orbiculata*) and *Lycopodium lucidulum*. This is the same association of species that one finds in southeastern Pennsylvania under the hemlocks, with the addition in the Adirondacks of *Linnaca americana*, *Clintonia borealis* and *Coptis trifolia*.

In more elevated situations, on Giant Mountain, one finds the forest to consist of *Picea* sp. and *Abies balsamea*, together with *Betula papyrifera*, *Acer rubrum*, *Betula lenta* and *B. lutea*, with a fern, *Dennstaedtia punctilobula* (= *Dicksonia pilosiuscula*), abundant, together with *Ribes prostratum* and *Rubus strigosus* (*Picea* facies).

*Pinus resinosa*, in a few localities, as on the southeastern slopes of Baxter Mountain (2,400 feet), makes a formation (*Pinus resinosa* formation). Sometimes *Pinus Strobus* is intermingled with *Juniperus communis alpina* together with *Vaccinium pennsylvanicum*, *V. canadense* and *Pteridium aquilinum* on the rocks (*Juniperus-Vaccinium* association). Near these rocks grow *Populus tremuloides*, *Amelanchier oligocarpa*, *Betula papyrifera*, *Spiraea salicifolia* and *Diercilla trifida*. The two pines dominate the southwest slopes of Baxter Mountain down to the lowest ridges, where *Quercus rubra*, *Acer pennsylvanicum*, *Tsuga canadensis* are in association, finally changing below to *Tsuga canadensis*, *Fagus americana*, *Abies balsamea* and *Acer saccharum*.

The ponds, or small lakes of the Keene Valley neighborhood, are fringed by *Chamaedaphne calyculata*, *Cornus alternifolia*, *Thuja occidentalis*, *Betula papyrifera*, *Abies balsamea*, *Picea Mariana* (= *P. rubens* Sargent) and *Pinus Strobus*, together with *Galium asprellum* and *Impatiens biflora*, while in the shallow water occur *Nymphaea advena* (*Nuphar advena*), *Lobelia Dortmanna*, *Eriocaulon* sp. and *Sparganium simplex* (lake-plant formation). The ferns of the forest, near such ponds, are *Polypodium vulgare* (on boulders), *Adiantum pedatum*, *Botrychium virginianum* and *Polystichum acrostichoides*.

ROCK-GORGE FORMATION.—This is typically developed in the Au Sable Chasm in the northern part of the Adirondack area. The Au Sable River has cut a narrow gorge, or occupied a fault, with almost straight sides and a few overhanging shelves of rock. Along the crest of the precipices and in the gorge, according to my observations, are found *Pinus resinosa*, *Betula papyrifera*, *Tsuga canadensis*, *Thuja occidentalis*, *Betula lutea* and *Acer rubrum*, while somewhat back from the gorge together with the above-mentioned trees are *Pinus Strobus*, *Betula populifolia*,

*Quercus rubra*, *Q. alba* and *Q. nigra*, beneath which occur *Ame-  
lanchier canadensis*, *Hamamelis virginica* and *Gaylussacia resinosa*.  
The rock crevices show *Campanula rotundifolia Langsdorfiana*,  
*Polypodium vulgare*, *Aralia racemosa*, *Rubus odoratus* and *Ribes  
rotundifolium*, and, on the ledges, clumps of *Rubus strigosus*.

UNIVERSITY OF PENNSYLVANIA.

## A KEY TO THE BROWN SESSILE POLYPOREAE OF TEMPERATE NORTH AMERICA

BY WILLIAM A. MURRILL

The pileate species of Polyporaceae have been recently grouped under three subfamilies; the Polyporeae, with porose hymenium and annual hymenophore, the Fomiteae, with porose hymenium and perennial hymenophore and the Agariceae, with furrowed hymenium. The plants treated in the present key are Polyporeae with brown context and without a distinct stipe.

### KEY TO THE GENERA.

Hymenophore sessile.

Spores hyaline.

Context light-brown.

Context at first fleshy, becoming slightly corky. **A. ISCHNODERMA.**

Context tough from the first.

Surface encrusted.

**B. ANTRODIA.**

Surface not encrusted.

Surface glabrous or nearly so.

Hymenium alveolate.

**C. FAVOLUS.**

Hymenium normally poroid.

**D. HALALOPILUS.**

Surface distinctly hairy.

**E. FUNALIA.**

Context dark-brown.

Context friable.

**F. PHAEOLUS.**

Context tough.

Tubes entire, pileus heavily bearded.

**G. POGONOMYCES.**

Tubes soon splitting into teeth, pileus velvety.

**H. CERRENELLA.**

Spores brown.

**I. INONOTUS.**

#### A. THE SPECIES OF ISCHNODERMA.

Plant large, brown, resinous.

*I. fuliginosum* (Scop.) Murr.

#### B. THE SPECIES OF ANTRODIA.

Plant small, brown, zonate, encrusted.

*A. mollis* (Sommerf.) Karst.